

Serial No.: 10/790,792
Docket No.: 102-1019
Amendment dated December 7, 2006
Reply to the Final Office Action of September 7, 2006

Amendments to the Claims

The listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method of fabricating an ink-jet print head ~~using a liquid-jet guided laser~~, the method comprising:
 - a process of forming an ink feeding port through a wafer which constitutes an ink-jet print head,
 - wherein:
 - the ink feeding port forming process comprises:
 - fixing the wafer to a stage in a chamber to perform the process, and
 - processing the ink feeding port in the wafer to a desired depth using ~~the a liquid-jet guided laser~~;
 - the operation of processing the ink feeding port comprises:
 - illuminating a laser beam guided by a liquid-jet having a diameter in the range of 10 to 500 μm through the liquid-jet guided laser, and
 - moving the stage, on which the wafer is fixed, along an ink feeding port pattern;
- and
 - the laser beam comprises one of a diode-pumped solid laser beam and a gas laser beam.
2. (Original) The method according to claim 1, wherein the operation of fixing the wafer comprises:
 - loading the wafer in a loader;
 - moving the wafer loaded in the loader to the stage in the chamber; and
 - arranging and fixing the wafer at a position of the stage.
3. (Cancelled)
4. (Currently Amended) The method according to claim ~~3~~ 1, wherein the liquid-jet comprises a material of a liquid state having a pressure in the range of 1 to 7,000 bars.

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5. (Cancelled)
6. (Original) The method according to claim 1, wherein the operation of processing the ink feeding port comprises:
 - illuminating a laser beam guided by a liquid-jet having a diameter in the range of 30 to 50 μm through the liquid-jet guided laser; and
 - moving the stage, on which the wafer is fixed, along an ink feeding port pattern.
7. (Currently Amended) The method according to claim 1, wherein the process of forming the ink feeding port further comprises:
 - cleaning an organic material having flown ~~in~~ onto the wafer during forming the ink feeding ports; and
 - drying the cleaned wafer.
8. (Original) The method according to claim 1, further comprising a process of dicing the wafer formed with the ink-jet print head, wherein the dicing process comprises:
 - fixing the wafer to the stage in the chamber; and
 - dicing the wafer using the liquid-jet guided laser.
9. (Original) The method according to claim 1, wherein the wafer comprises a silicon wafer having a thickness in the range of 100 to 600 μm , and at least one ink feeding port is formed in one of a central feed type, an edge feed type, and an individual feed type.
10. (Currently Amended) A method of fabricating an ink-jet print head, the method comprising:
 - a dicing process of dicing a wafer formed with a plurality of print heads using a liquid-jet guided laser,
 - wherein:
 - the dicing process comprises:

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_____ fixing the wafer to a stage of a chamber; and
_____ dicing the wafer using the liquid-jet guided laser;
the operation of dicing of the wafer comprises:
_____ illuminating a laser beam guided by a liquid-jet having a diameter in the range of
10 to 500 μm through the liquid-jet guided laser, and
_____ moving the stage, on which the wafer is fixed, along a dicing pattern; and
the laser beam comprises one of a diode-pumped solid laser beam and a gas laser
beam.

11. (Original) The method according to claim 10, wherein the operation of fixing the wafer comprises:

loading the wafer in a loader;
moving the wafer loaded in the loader to the stage in the chamber; and
arranging and fixing the wafer at a position of the stage.

12. (Original) The method according to claim 10, wherein the operation of dicing the wafer comprises:

illuminating a laser beam guided by a liquid-jet having a diameter in the range of 30 to 100 μm through the liquid-jet guided laser; and
moving the stage, on which the wafer is fixed, along a dicing pattern.

13. (Original) The method according to claim 12, wherein the liquid-jet comprises a material of a liquid state having a pressure in the range of 1 to 7,000 bars.

14. (Original) The method according to claim 12, wherein the laser beam comprises one of a diode-pumped solid laser beam and a gas laser beam.

15. (Currently Amended) The method according to claim 10, wherein the dicing process further comprises:

cleaning an organic material having flown ~~in~~ onto the print heads cut in the form of chips

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during the dicing of the wafer; and
drying the cleaned print heads in the form of chips.

16. (Currently Amended) A method of fabricating an ink-jet print head, the method comprising:

forming ~~the~~an ink-jet print head with an ink feeding port on a wafer using a liquid-jet guided laser;

wherein the operation of forming of the ink feeding port comprises:

illuminating a laser beam guided by a liquid-jet having a diameter in the range of 10 to 500 μm through the liquid-jet guided laser, and

moving the stage, on which the wafer is fixed, along an ink feeding port pattern;
and

the laser beam comprises one of a diode-pumped solid laser beam and a gas laser beam.

17. (Currently Amended) The method according to claim 16, wherein the forming operation comprises:

forming ~~an~~the ink-feeding port on the wafer to a predetermined depth using the liquid-jet guided laser.

18. (Original) The method according to claim 17, wherein the operation of forming the ink-feeding port does not perform a wet etching operation using a mask.

19. (Original) The method according to claim 17, wherein the forming operation comprises:

moving the wafer with respect to a liquid-jet guided laser unit, which generates the liquid-jet guided laser, in a direction having an angle with an injecting direction of the liquid-jet guided laser.

20. (Currently amended) The method according to claim 19, wherein the forming

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operation comprises:

simultaneously illuminating ~~a~~the laser beam and ~~a~~the liquid-jet in a direction having an angle with the moving direction of one of the wafer and the liquid-jet guided laser unit.

21. (Original) The method according to claim 16, further comprising:
dicing the wafer into a plurality of chips each having at least one print head, using the liquid-jet guided laser.

22. (Original) The method according to claim 21, wherein the dicing operation does not perform a wet etching operation using a mask.

23. (Withdrawn) A method of fabricating a print head, comprising:
etching a first surface of a substrate to a predetermined depth at a location different from a location of a heating unit located on a second surface of the substrate using a liquid-jet guided laser.

24 (Withdrawn) The method according to claim 23, wherein the etching of the first surface comprises:

etching the first surface of the substrate to the predetermined depth at a location between first and second heating units located on the second surface of the substrate and separated by a predetermined distance using the liquid-jet guided laser.

25. (Withdrawn) A method of fabricating a print head, comprising:
etching a through hole in a first surface of a substrate at a location different from a location of a heating unit located on a second surface of the substrate using a liquid-jet guided laser.

26 (Withdrawn) The method according to claim 25, wherein the etching of the first surface comprises:

etching the through hole in the first surface of the substrate at a location between first

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and second ink ejection holes located on the second surface of the substrate and separated by a predetermined distance using the liquid-jet guided laser.

27. (Withdrawn) A method of forming an ink jet print head, comprising:
separating a plurality of ink jet print heads connected together using a liquid-jet guided laser.